Population Ecology and Habitat Use of Burrowing Owls in Eastern Washington

Annual Report for 2001

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by

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Burrowing owls (*Athene cunicularia*) in North America have suffered population declines and significant range contraction (Dechant et al. 1999). Burrowing owls are considered threatened or endangered in Minnesota, Iowa, Mexico, and Canada, and populations have declined significantly in British Columbia, Alberta, Arizona, California, Colorado, Kansas, Nebraska, Nevada, New Mexico, Utah, and Washington (James and Espie 1997). Burrowing owls are federally endangered in Canada, federally threatened in Mexico, and were listed as a federal species of concern in the U.S. in November 2000. Many state wildlife agencies are becoming increasingly concerned about declining burrowing owl populations. Indeed, Washington Department of Fish and Wildlife is currently evaluating whether to add burrowing owl to the state list of threatened/endangered species. In response to concerns regarding the status of burrowing owls, the U.S. Fish and Wildlife is currently conducting a range-wide status review.

Despite the widespread declines and increased concern for burrowing owl populations in Washington and throughout North America, few conservation efforts exist to reverse population declines. Because burrowing owls are still present in many areas throughout the west (Dechant et al. 1999), we need to implement effective on-the-ground conservation efforts quickly to reverse declining population trends. Quick action will prevent further declines and avoid future listing under the federal Endangered Species Act.

Prior to developing and implementing recovery efforts, we need to understand the ultimate cause of population declines and the proximate factors influencing local distribution, reproductive success, and annual survival of burrowing owls. Burrowing owls require short-grass habitats and prefer open areas within deserts, grasslands, and shrub-steppe (Haug et al. 1993). Local population declines in even relatively undisturbed shrub-steppe habitat in Washington suggests that conversion of native shrub-steppe habitat to agriculture may not be the only cause of burrowing owl declines. For example, lack of suitable nesting burrows due to the eradication of colonial burrowing mammals may also limit burrowing owl populations (Desmond and Savidge 1996). The goals of our cooperative multi-agency project are to 1) survey areas in eastern Washington to determine local population status and estimate population trends, 2) locate and monitor natural nesting burrows in eastern Washington weekly throughout the breeding season to estimate annual reproductive success and annual burrow fidelity, 3) determine migratory status of burrowing owls in eastern Washington, 4) estimate annual survival probability of male and female burrowing owls, 5) examine the habitat and landscape features that influence reproductive success, territory fidelity, and annual survival, and 6) examine the efficacy of using artificial burrows to restore local burrowing owl populations.

Project partners

We have brought together a large number of project partners: U.S. Bureau of Land Management, USGS-BRD, U.S. Fish and Wildlife Service (Hanford Reach National Monument/Saddle Mountain National Wildlife Refuge, McNary National Wildlife Refuge, Columbia National Wildlife Refuge), Washington Department of Fish and Wildlife, Washington State University, Washington Department of Natural Resources, University of Arizona, U.S. Golf Association, Kennewick Irrigation District, Lower Columbia Basin Audubon Society, and 9

golf courses in eastern Washington. Personnel working on the project included Dr. Courtney J. Conway, Victoria Garcia, Darcie Westerman, Justine Sears, Suzanne Gearhart, Elizabeth Seal, Kevin Goldie, Christa Beckmann, Andrea Wuenschel, Matthew D. Smith, Gina Grasso, Gwenyth Balmer, Damon Hearne, Megan Hearne, Christopher Forristal, and Charlotte Reep (Lower Columbia Basin Audubon Society).

Natural nesting burrows

We located and monitored 176 natural burrows in the Tri-Cities area and we located and monitored 161 burrows in the Moses Lake/Othello area in 2001. We visited all nesting burrows (artificial and natural) weekly throughout the breeding season to document occupancy and reproductive success. During each visit, we determined burrow status (occupied, not occupied) and nesting stage (Appendix 1). We first observed burrows from >100m away using binoculars to check for owl activity and then approached each burrow on foot to look for pellets, feathers, or presence of cobwebs at burrow entrance. From these weekly visits, we recorded information pertaining to each burrow: signs of owl use, currently occupied or not, successful nest or not, and the number of young fledged.

Moses Lake 2000: In 2000, in the Moses Lake study area, we monitored 80 burrows. Of these, 37 were occupied. Of the 37 occupied burrows, one had an unpaired male, and 36 were occupied by a pair. Of the 36 nests that were occupied by a pair, 31 produced chicks, whereas no chicks were observed at 5 of these nests. The mean number of chicks per successful nest was 4.0 ± 1.77 chicks/nest. We observed a total of 124 hatch-year burrowing owls. In the Moses Lake study area, of 37 nests occupied in 2000 for which the origin was known/recorded, 32.4% were in badger burrows, 27.0% were in a non-natural structure (e.g., under concrete foundation, in metal culvert), 21.6% were in marmot burrows or in rock piles probably dug into by marmots, 8.1% nested in a badger hole dug under a man-made structure, 8.1% were artificial burrows placed in the ground to provide more nesting sites for Burrowing Owls, and 2.7% were in coyote burrows. In 2000, one of our nests was on BLM lands. In the Moses Lake area in 2000, the largest percentage (48.6%) of nests is on private lands, or on county land enclosed within private lands. A large percentage (24.3%) of nests were on county land adjacent to roads, canals, and irrigation structures. Many nests (18.9%) were on public lands such as on the bank of an interstate highway or a municipal airport. We do not know who the owner is for a small percentage of nests (8.1%).

Moses Lake 2001: In the Moses Lake study area, 84 of the 161 natural and artificial burrows were occupied in 2001. We observed a male but no female at four burrows, and 80 were occupied by a pair that attempted to breed. Of the 80 pairs, 71 produced chicks. The average number of chicks produced at the 71 burrows was 5.07 ± 2.40. We observed a total of 355 hatch-year burrowing owls at nest burrows. In the Moses Lake study site, we used an infrared video probe to examine nest contents in a subset (n = 36) of our natural burrows and did not use the probe on the remainder of our natural burrows (n = 44). We randomly selected which burrows to examine with the video probe so that we could test whether repeated use of the probe affects nest abandonment or reproductive success of nesting owls. The proportion of nests that fledged ≥1 offspring was similar for nests which were repeatedly examined using the infrared

probe (78%) and control nests (75%). The maximum number of offspring seen above ground was similar for nests which were repeatedly examined using the infrared probe (3.5 $\pm$ 0.4 offspring) and control nests (3.9 $\pm$ 0.4 offspring). Hence, the use of the infrared probe did not negatively affect burrowing owl reproductive success. In the Moses Lake study area, of 78 nests occupied in 2001 for which the origin was known/recorded, 41.0% were in badger burrows, 24.4% were in a non-natural structure (e.g., under concrete foundation, in metal culvert), 17.9% nested in a badger hole dug under a non-natural structure, 9.0% were in marmot burrows, 5.1% were in artificial nesting burrows, and 2.6% were in coyote burrows. Land ownership at nest sites was similar in 2001: three of our nests were on BLM lands, and the largest percentage (47.6%) of nests were on private lands, or on county land enclosed within private lands. A large percentage (23.8%) of nests were on county land adjacent to roads, canals, and irrigation structures. Many nests (21.4%) are on public lands such as Washington State University experimental agricultural station, Warden sewage treatment plant, the municipal airport or the edge of an interstate. We do not know who the owner is for a small percentage of nests (7.1%).

Tri-Cities 2001: In the Tri-Cities study area, we saw an owl at 107 of the 176 natural burrows in 2001; 80 of these had a resident male (male present on multiple visits), 70 were active nests (burrows with signs of nesting activity), and 59 of these nests produced young ($\geq$1 nestling seen at burrow entrance). In these 59 natural nesting burrows, the mean number of young produced was: 4.7 $\pm$ 2.1 (range 1-10) for burrows not associated with golf courses, and 5.3 $\pm$ 1.4 (range 4-7) for burrows on golf courses. Our data also allow comparison of annual re-occupancy, reproductive success, and burrow fidelity between artificial and natural burrows (Table 1). In the Tri-Cities, most of the natural burrows we found and monitored were located incidentally. Most natural burrowing owl nests were in badger (*Taxidea taxus*) burrows. In the Tri-Cities, of 70 nests occupied in 2001 for which the origin was known/recorded, 72.9% were in badger burrows, 7.1% were in ground squirrel (*Spermophilus* spp.) or marmot (*Marmota flaviventris*) burrows, 0.0% were in coyote (*Canis latrans*) burrows, 15.7% were in artificial nesting burrows, and 4.3% were in a non-natural structure (e.g., under concrete foundation, in metal culvert). We found and monitored 3 active burrows (plus 1 not active) in 2001 on the Arid Lands Ecology (ALE) Reserve on Hanford Reach National Monument. At *ALE-01*, we never found any signs of burrowing owl activity. At *ALE-02*, our data indicate this nest failed due to an unknown cause. At *ALE-03*, we believe a male remained unpaired throughout the breeding season. *ALE-04*, we found 2 adults and 3 juvenile burrowing owls (all were banded).

Artificial burrow placement and installation

Artificial nesting burrows have been used successfully to augment nesting habitat in local areas (Collins and Landry 1977, Trulio 1997) and may provide safer nest sites than natural burrows (Wellicome et al. 1997). Artificial nesting burrows may help restore burrowing owl populations but the effects of artificial burrow use on burrow fidelity and reproductive success have not been examined. We are installing artificial nesting burrows in a variety of landscape settings in the Tri-Cities area. We are installing artificial burrows in groups of 2 and we vary burrow placement relative to landscape features within a pair of burrows. We have developed an artificial burrow installation procedure that is relatively easy and have developed detailed

instructions including materials required for installation (Conway and Smith 2000). An artificial nesting burrow consists of a 19-liter (5-gallon) plastic bucket buried upside-down (without the lid) 1.3 m below ground. We use 3 m of 10-centimeter (4-inch) diameter black corrugated drainage tubing to create a sloped tunnel leading from the ground surface down to the nest chamber. The 10-centimeter opening is all that is visible after an artificial burrow is installed. The Lower Columbia Basin Audubon Society (coordinated by Charlotte Reep) has worked with volunteers in the community to help us install these artificial burrows. Of the 87 burrows installed in natural areas, 25 had signs of use by burrowing owls. We observed at least 1 owl at 18 of these burrows, 9 of the artificial burrows were used as nest burrows, and 5 artificial burrows produced young in 2001. Of the 130 artificial burrows installed on golf courses, 8 had signs of use. We observed at least one owl at 6 of these burrows, 2 were used as nests, and 2 produced young.

Survival and annual burrow fidelity

We sought to trap and individually mark owls so that we could compare annual burrow fidelity between artificial and natural burrows and also examine annual survival of owls nesting in different burrows in future years.

Moses Lake 2000: At the Moses Lake study area in 2000, we trapped owls at 43 nests and caught ≥1 owl at 42 nests during 645 trap-hours (1878 person hours). We caught and banded 84 burrowing owls; 60 juveniles and 24 adults (10 males and 14 females). We recorded 200 re-sights of banded birds in Moses Lake in 2000.

Moses Lake 2001: At the Moses Lake study area, we trapped owls at 95 nests and caught ≥1 owl at 71 nests during 1096 trap-hours (1404 person hours). We caught and banded 273 burrowing owls in 2001; 175 juveniles and 98 adults (51 females and 47 males). All 573 birds received a USFWS band and a unique ACRAFT color band. In 2001, we recorded 846 re-sights of banded birds in the Moses Lake study area.

Tri-Cities 2001: At the Tri-Cities study area, we trapped owls at 109 nests and caught ≥1 owl at 70 nests during 1506 trap-hours (3124 person hours) in 2001. We caught and banded 300 burrowing owls in the Tri-Cities area in 2001; 209 juveniles and 91 adults (47 females and 44 males). In 2001, we recorded 217 re-sights of banded birds in the Tri-Cities study area.

Causes of juvenile mortality

Moses Lake 2000: In Moses Lake in 2000, we placed transmitters on 21 burrowing owls from 19 different nests. Of the juveniles with transmitters, 5 were found dead and 2 returned to breed in 2001. The signals on 5 juveniles were lost, and these are presumed dead. Three juveniles are presumed to have dispersed, and the fate of 3 juveniles is unknown. The transmitter fell off 3 juveniles. Of the 5 juveniles that were found dead, 3 were presumed to be depredated by a raptor, 1 died of a collision with a vehicle, and 1 died of an unknown cause.

Moses Lake 2001: We radio collared 30 juvenile owls from 30 different nests in the Moses Lake study area in 2001. Juveniles were radio collared at 34.8 days of age (range 14.5-57 days). Of these 30 juveniles, 11 were found dead prior to initiating migration, 12 disappeared (presumably dispersed), and the signal disappeared on 6 birds prior to presumed dispersal date.

Of those found dead, the presumed causes of mortality included: avian predation, unknown predation, illness or starvation, possible smoke inhalation (from a fire).

Returns of birds banded from 2000

Moses Lake: Of the 24 adult owls banded in 2000 in the Moses Lake study area (10 males and 14 females), we re-sighted 9 of them (4 males and 5 females) in 2001. Hence, 40% of the breeding males returned as breeders and 36% of the breeding females returned as breeders in 2001 in the Moses Lake area. Of the 60 juvenile owls banded in 2000 in the Moses Lake study area, we re-sighted 3 of them in 2001. Of the 60 juveniles banded in 2000, 22 were radio collared. Of the 3 juveniles from 2000 re-sighted in 2001, 2 had radio collars. The radios were still emitting signals on the 2 radio-collared birds. Hence, 9.1% of the radio-collared juveniles in 2000 returned as breeders in 2001 whereas only 1.7% of the banded juveniles in 2000 returned as breeders in 2001.

Tri-Cities: Of the 18 adult owls banded in 2000 in the Tri-Cities study area, we re-sighted 11 of them (6 males and 5 females) in 2001. Of the 56 juvenile owls banded in 2000 in the Tri-Cities study area, we re-sighted 2 of them in 2001. One of the juveniles banded in 2001 in the Tri-Cities area was found dead in San Francisco on 11 November and reported to the USFWS National Bird Banding Lab. Continued re-sighting data in 2002 and 2003 will allow us to estimate annual survival of burrowing owls in the area.

Standardized surveys to locate natural nesting burrows

Our project objectives require location of natural nesting burrows so that we can estimate local reproductive success and determine the habitat features that influence success. Hence, we had to develop methods for locating natural nesting burrows. We conducted 3 types of standardized survey efforts in an effort to locate nesting burrowing owls: roadside point count surveys, driving surveys, and walking surveys. *Roadside Point Count Surveys*: We established and conducted 10 point-counts along 1 roadside survey route on ALE. We detected no burrowing owls or active burrows during these surveys in 2001. We surveyed 430 points (107.5 miles of roadside surveys) in the Moses Lake study area in 2001. We detected 24 owls (9 adults, 15 juveniles) during the survey. Twenty-two of the owls were detected during the survey itself and 2 owls were detected between points. Another nest burrow with owl sign (but no owls present) was detected during the survey. A total of 7 new burrows were found as a result of the standardized survey effort. Three additional burrows were found during subsequent visits to the newly detected burrows for a total of 10 new nests resulting from the surveys. Hence, our standardized roadside surveys required 143 person-hours, but increased the number of burrows monitored in the Moses Lake study area in 2001 by 12.5%. We surveyed 123 points (31 miles of roadside surveys) in the Tri-Cities study area in 2001. We detected five birds and four nests on these standardized roadside surveys. *Driving Survey*: We conducted 4 standardized driving surveys on ALE. We detected 1 active burrow during our driving surveys. *Walking Surveys*: We conducted 2 standardized walking surveys on ALE, and 1 survey of an area where owls were thought to have been seen by ALE personnel. We found no active burrows during our walking surveys.

In 2000, we surveyed 90 points along 9 routes that were 2.5 miles in length (22.5 miles of roadside surveys) in areas to the northeast of the Moses Lake study area, including routes in Bailey and Odessa. We detected no owls during the surveys. We also conducted walking transect surveys in areas where owls were thought to have been present. During the period of 5 April 5 - 6 June, 120 1-mile transects were surveyed. We recorded the GPS coordinates of any burrows that we found that could be used by owls. However, no active burrows or burrowing owls were ever found during the surveys.

Historical nesting burrows

During the 2000 field season we did intensive walking surveys to locate 14 historical burrows (located 1960-1998) on ALE listed in the WDFW wildlife observation database. We located 9 of these historical burrows, but none of these showed any signs of recent activity by burrowing owls. The other 5 historical burrows were not located and presumably have collapsed/disappeared. We also investigated 5 historical burrow locations (occupied in 1996-99) on ALE obtained from Bill and Nancy LaFrambois; Route 240 at mile post 16 (occupied in 1996 and 1997), near 106 gate (occupied in 1996 and 1997), near intersection of 1200' road and Benson road ~200m north of the intersection and 150m west of road near top of gully (occupied in 1997 and 1998), 90º corner along road to summit where road gets steep (1998), Route 240 at mile post 14 (occupied in 1999). We did not find burrowing owls or active sign at any of these recently-used burrows on ALE.

Breeding phenology

We need to know the time of year when adult owls typically return from migration and search for available nesting burrows. This information is important for determining the most effective dates for conducting local population surveys. Hence, we documented when male and female owls return to natural burrows in 2001. A portion of the burrowing owl population in the Tri-Cities area are year-round residents; some burrows have a single owl present (usually a male) throughout the winter. However, most of the population is migratory. Of 48 nests monitored weekly beginning on 1 Feb 2001 in the Tri-Cities study area, 17 were already occupied, and mean male arrival date for the remaining 31 nests was 16 March (range 15 February-8 June). Most males (77.1%) were observed at their burrow entrance by mid-March. Three females were seen on our first nest checks and presumably over-wintered. The remaining females arrived later; mean female arrival in 2001 was 29 March (15 February - 8 June). Most females (71%) arrived by 1 April in the Tri-Cities area.

Salvage of dead owls

We found 33 dead burrowing owls (2 adults, 29 juveniles, and 2 owls of unknown age) in 2001 in the Tri-Cities area and 40 dead owls (4 adults, 24 juveniles, and 12 owls of unknown age) in 2001 in the Moses Lake study area. Of the 33 dead owls in the Tri-Cities area, 1 appeared to have been hit by a car, 2 appeared to have been depredated by a raptor, 17 appeared to have been depredated by a terrestrial predator (i.e., coyote, only the legs were found), 2 (both juveniles) appeared to have died of starvation, and 11 died of unknown causes. Of the 40 dead

owls in the Moses Lake area, 4 appeared to have been hit by a car, 8 appeared to have been depredated by a raptor, 6 appeared to have been depredated by a terrestrial predator, 13 appeared to have been depredated by unknown predator (raptor or mammal), 5 were found dead without any signs of predation, and 4 died of unknown causes. Some of the owls found "depredated" could have died of other causes and thereafter been scavenged. Thirty-three and 40 dead owls seems like a high number to find incidentally (usually near their nest) and via telemetry, but juvenile mortality is undoubtedly high for all burrowing owl populations. Comparison of the number of mortalities found among my other study areas will help determine whether these numbers are unusually high.

In Moses Lake in 2000, we found 21 dead burrowing owls. Of the 21 dead owls, one was an adult, 18 were juveniles, and 2 are of unknown age. Of the dead owls found, 3 appeared to have been hit by a car, 6 appeared to have been depredated by a raptor, 5 appeared to have been depredated by a terrestrial predator, 3 appeared to have been depredated by unknown predator (raptor or mammal), and 2 were found dead without any signs of predation.

Detection-probability trials at active nests

We conducted detection probability trials at active nests so that we could estimate the effectiveness of using vocal surveys for detecting nesting burrowing owls. We conducted 431 detection trials at the Tri-Cities study area and 746 detection trials at the Moses Lake study area. At the Tri-Cities study area, a burrowing owl was detected on 38.6% of 3-minute passive detection trials and on 46.7% of 3-minute call-broadcast detection trials (n=431 trials). If we exclude trials in which owls were not present at their nest during our trial (determined by walking to the nest after the trial), detection probability was 46.6% for passive trials and 56.5% for call-broadcast trials (n=354 trials).

At the Moses Lake study area in 2001, a burrowing owl was detected on 59.7% of the trials either before the trial, during the passive period, or during the call broadcast (n=745 trials). An owl was detected 34.9% of the time before the trial, 37.4% of the time during the passive period, and 48.7% of the time during the call broadcast. If we exclude trials in which owls were not present at their nest during our trial (determined by walking to the nest after the trial), detection probability was 49.2% for passive trials and 64.0% for call-broadcast trials (n=567 trials).

At the Moses Lake study area in 2000, a burrowing owl was detected on 66.7% of the trials either before the trial, during the passive period, or during the call broadcast (n=18 trials). An owl was detected 11.1% of the time before the trial, 66.7% of the time during the passive period, and 44.4% of the time during the call broadcast. If we exclude trials in which owls were not present at their nest during our trial (determined by walking to the nest after the trial), detection probability was 75% for passive trials and 50% for call-broadcast trials (n=16 trials).

We conducted detection trials during various times during the day (4:00am - midnight) and throughout the breeding season. As more data from our detection trials accumulate, we will be able to estimate detection probability for each 2-hour time period of the day during each 3-week period of the breeding season to recommend the most effective survey and monitoring methods.

Measurement of habitat features at nests

We measured habitat and landscape features at 16 active nest burrows in 2000 and at 69 active nest burrows in 2001 at the Moses Lake study area. We were unable to conduct habitat measurements at all of our nest burrows in the Tri-Cities area due to time and personnel limitations. We will complete habitat measurements for remaining nest burrows in 2002.

Media coverage and public relations

We received substantial media and press coverage of our project in 2000. The local newspaper, the *Tri-City Herald*, did a front-page feature story on the project (5 April 2000). The *Seattle Times* also included a feature article on the project (11 April 2000 issue). A regional cable television show, *Washington Wildlife*, did an episode for their program on our project this summer. The program is carried by 33 local cable television stations throughout Washington, Oregon, and Idaho. We also were contacted by *Golf Course News* and asked to write an article for their magazine summarizing our project; the article appeared in the May 2000 issue and was featured in an inset on the cover of that issue. We continued to receive media coverage in 2001. The local ABC news affiliate (KVEW) produced and aired a 10-minute story on our project. The story detailed the goals and objectives of the project and the unique partnership among state and federal natural resource agencies, the local Audubon Society, the University, and local golf courses.

Proposed research schedule and anticipated results for the coming year

In the coming year, we will continue to monitor all of the nesting burrows in eastern Washington weekly from 1 March - 30 August 2002 to quantify use of our nesting burrows by Burrowing Owls. We will follow radio-marked juveniles through October until they leave their natal burrow. We will also check our burrows once during the winter (8-16 December) to determine the percentage of birds that spend the winter in eastern Washington. We will finish measuring landscape features at the remainder of our burrows to document the features that influence burrow occupancy and success. We will publish several scientific articles in peer-reviewed journals summarizing project results and accomplishments.

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Table 1. Occupancy and success of artificial and natural burrows both on and off golf courses in the Tri-Cities study area in eastern Washington.

	Artificial Burrows		Natural Burrows	
	on golf courses	off golf courses	on golf courses	off golf courses
burrows installed prior to '00	5	84		
burrows installed in '00	99	2		
burrows installed in '01	26	1		
burrows monitored in '00	104	86	10	133
burrows monitored in '01	130	86	10	186
burrows destroyed in '00	0	1	0	10
burrows destroyed in '01	0	4	0	20
burrows with no sign of use in '00	98	63	0	19
burrows with no sign of use in '01	122	57	0	68
burrows with owl sign in '00	6	22	10	105
burrows with owl sign in '01	8	25	10	108
burrows with owl observed in '00	3	19	10	103
burrows with owl observed in '01	6	18	10	97
burrows with "resident" male in '00	0	9	8	59
burrows with "resident" male in '01	2	10	8	72
burrows with 2 adults observed in '00	2	6	8	52
burrows with 2 adults observed in '01	2	9	7	63
burrows used as nest in '00	0	6	8	48
burrows used as nest in '01	2	9	7	57
burrows that produced young in '00	0	4	8	39
burrows that produced young in '01	2	5	7	52
young/active nest in '00 (SD; range)	0	3.0 (1.4; 1-4)	2.5 (1.2; 1-4)	3.2 (1.4; 1-6)
young/active nest in '01 (SD; range)	3.0 (1.4;2-4)	3.4 (3.0;1-8)	5.3 (1.4;4-7)	4.7 (2.1;1-10)
burrows that fledged ≥1 young in '00	0	3	8	33
burrows that fledged ≥1 young in '01	2	5	7	52
young/fledged nest in '00 (SD; range)	0	3.7 (0.6; 3-4)	2.5 (1.2; 1-4)	3.2 (1.4; 1-6)
young/fledged nest in '01 (SD; range)	3.0 (1.4;2-4)	3.4 (3.0;1-8)	5.3 (1.4;4-7)	4.7 (2.1;1-10)

Table 2. Occupancy and success of Burrowing Owls in 2000 and 2001 in the Moses Lake area of eastern Washington.

	2000	2001
burrows monitored	80	161
burrows not in use	43	78
nest burrows	37	83
burrows with unpaired male	1	4
burrows with 2 adults observed	36	79
burrows with 2 adults where no	6	9
burrows that produced young	31	70
Total # of offspring observed	124	355
young/active nest (SD; range)	4.0 (1.77; 1-8)	5.07 (2.40; 1-10)
burrows that fledged ≥1 young	30	64
young/fledged nest (SD; range)		4.05(1.94; 1-10)